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Applicant(s):	James Hayden Brownell	Confirmation No.	8895
Serial No.	10/529,343	Group Art Unit:	2828
Filed:	March 25, 2005	Examiner:	Stafford, Patrick
For:	FREE ELECTRON LASER, AND ASSOCIATED COMPONENTS AND METHODS		

March 30, 2009

Mail Stop Appeal Brief – Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

REPLY BRIEF

Dear Sir:

In accord with 37 C.F.R. 41.37(c) and 41.41(a), Appellant hereby files a Reply Brief in response to the Examiner's Answer mailed January 28, 2009, and in further support of the Appeal in the above-identified Application. An Appeal Brief was filed October 15, 2008 (Amended Appeal Brief filed November 26, 2008), responsive to the final Office Action of March 21, 2008. A notice of appeal was filed on July 17, 2008.

Pursuant MPEP 1208(I), and in compliance with 37 C.F.R. 41.37(c), this Reply Brief includes the following items, each starting on a separate page:

II. STATUS OF CLAIMS

Claims 2-14 and 16-17 are pending in the present Application, with claims 2, 10-11, 14, and 16 being independent.

Claim 10 was allowed by the Panel Decision from Pre-Appeal Brief Review mailed September 15, 2008.

Claims 1, 15, and 18 were cancelled during prosecution.

Claims 11-14 and 16-17 were withdrawn during prosecution, although independent claim 2 is generic to each of independent claims 11, 14, and 16.

Claims 2-9 are original (without amendment during prosecution), and the rejection of claims 2-9 is being appealed herein.

III. GROUNDS FOR REJECTION TO BE REVIEWED ON APPEAL

A. The rejection of claims 2-5 and 7-9 under 35 U.S.C. 103(a) as being unpatentable over Kramer (U.S. 4,852,956) in view of Walsh (U.S. 5,263,043).

B. The rejection of claim 6 under 35 U.S.C. 103(a) as being unpatentable over Kramer in view of Walsh, and further in view of Hamada (U.S. 4,972,075).

IV. ARGUMENT

A. The Section 103 Rejection of Claims 2-5 and 7-9 Is Still Deficient on Its Face.

The Examiner's Answer fails to sufficiently rebut Applicant's meritorious traversal of the rejection of claims 2-5 and 7-9. The rejection is based on insufficient consideration of all of the recited claim language, erroneous factual assertions regarding the cited prior art, and a proposed combination of references that is not taught or suggested. The Answer compounds several of these errors from the original rejection, which should be reversed by this Board.

1. The Answer misrepresents the clear meaning of a grating horn as defined in the present Specification.

The Answer (page 9, first full paragraph) correctly refers to paragraph 35 of the present Specification as defining the term "grating horn" of the present claims, but the Answer misleadingly asserts that the definition of the term cited by the Examiner comes from this paragraph. The language quoted by the Examiner actually comes from paragraph 30 of the Specification, which only defines a "horn," and not a grating horn. Although a grating horn is a horn, not every horn will meet the definition of a grating horn, as the term is defined in the Specification, and as the term has become known in this field of art.

The Board should here note that the Examiner's additional assertion (page 10, first full paragraph of the Answer) is incorrect that the arguments addressing the earlier Restriction Requirement are moot with respect to this appeal. Applicant did not request that this Board reverse the Restriction. Quite the contrary. The arguments pointed out that the only substantive difference between rejected claim 2 and restricted claim 11, for example, is that the term "grating horn" appears in the preamble of claim 2 and the body of claim 11, and that the Examiner has determined that this difference <u>only</u> renders these claims so patentably distinct as to require a restriction. This *legal* determination regarding claim differentiation does not disappear, merely because it was made in the context of a Restriction Requirement. The Examiner made final the ruling that, including

a grating horn in the body of the claim, by itself, made claim 11 a different invention than claim 2. That is, the Examiner has already adopted, and maintains, the legal position that including the grating horn in the body of the claim, by itself, renders claim 11 patentably distinct from claim 2. The Board should not allow the legal conclusion that the grating horn is obvious while the Examiner maintains the entirely contradictory legal position that the grating horn is a different invention.

The Board should further note that the Answer does not challenge the argument that the grating horn limitation in the preamble of independent claim 2 should be given patentable consideration. Instead, the Examiner just asserts that Kramer -- and Kramer alone -- "teaches the grating horn as defined by applicant." (Answer, last paragraph beginning on page 9). As explained further below, this assertion is also incorrect. Kramer does not teach or suggest a grating horn.

2. The Answer's assertion that Kramer teaches a grating horn is clearly erroneous.

A grating horn requires, at a minimum, the recited horn structure interacting with an electron beam, as clearly featured in claim 2, and described in paragraph 35 of the present Specification. The Answer correctly acknowledges that Walsh teaches a Smith-Purcell FEL, and does not show any horn structure to its planar grating element(s). The Examiner continues to incorrectly assert, however, that a grating horn is entirely shown by Kramer. Whether or not Kramer may show a "horn," however, Kramer entirely fails to teach or suggest any interaction with an electron beam, as required by claim 2, and therefore cannot teach the grating horn as alleged.

The most telling flaw in the rejection thus appears in this regard. The first line of the last paragraph of page 3 of the Answer repeats the highly misleading statement that "[Kramer] does not explicitly teach ***the*** electron beam interacting with the grating elements produces Terahertz radiation." (Emphasis added). In fact, Kramer expressly fails to teach any electron beam, let alone one interacting with its grating elements. As clearly demonstrated by the remaining text of this paragraph from the Answer, the proposed combination with the free electron laser (FEL) and electron beam from Walsh

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is merely presumed. Nowhere does either reference teach or suggest a combination with the other.

The Examiner's still further assertion, namely, that "the term 'grating horn' is not a well known term of art," is also unfounded. The present inventors coined the term, but according to its clear definition in the present Specification. Since its origination by the present inventors, the term has come to be recognized in this narrow, but known, field of art. See, for example, a recently published later U.S. patent application to Coyle (U.S. 2008/0060455, priority filing date of December, 2004, different inventor and assignee), which states:

More sophisticated geometries, *such as a Grating Horn where the planar reflector is folded around the beam* (i.e., a V-shaped structure where the e-beam is located just above the intersection of the V), enhance the coupling dramatically, in one embodiment. (Paragraph 69, emphasis added).

In other words, other publications have further recognized that a “Grating Horn” is a term of art, and in a manner entirely consistent with the description and drawings in the present Application. In the present case, the Examiner was required to give this term full consideration according to the clear lexicographic definition in the Specification, as well as its further consistent use in the field of art. Such consideration, however, has not been afforded the claims in the present case. The rotating structure from Kramer cannot be correctly interpreted to somehow read upon the clear requirements of an electron beam-requiring grating horn.

Kramer teaches only a rotating diffraction grating for interaction with an laser, with simply no mention of an electron beam in any capacity. As clearly shown in both Figs. 1 and 7 of the present Application, a laser beam (26, 710) is separate and distinct from an electron beam (14, 704), and a laser beam is utilized differently in an FEL than in a laser device without an electron beam. Walsh even expressly distinguishes a simple FIR laser (the Examiner acknowledges that Kramer does not even teach FIR) from an FEL, in that an FIR laser "lacks tunability" (col. 2, lines 7-8) -- a key feature of an FEL -- and that "Tuning the wavelength of [FELs] is not straightforward." (Col. 2, lines 17-18).

In other words, Walsh here clearly teaches away from the Examiner's broader assertion that one of ordinary skill in the art would just assume that any laser structure, such as that in Kramer, can be easily modified into an FEL, such as that taught by Walsh. Walsh expressly rejects such assumptions, and thus the proposed modification could not have been properly deemed obvious.

The Answer still further fails to consider fact that an example of a rotatable turret structure, somewhat similar in concept to Kramer, is described at paragraph 23 of the present Application. No reasonable interpretation of this description though, could arrive at the conclusion that the example is some form of the grating horn(s) described and illustrated later throughout the Application.

A rotatable turret like Kramer's could be implemented in conjunction with an FEL in order to extend coverage of the wavelength range produced by the electron beam passing over the turret, and through the laser. (Paragraph 23). It is clear from this description though, that the rotatable turret is positioned to directly affect the laser beam, and not to directly affect the electron beam itself, unlike the configuration presented by a grating horn, which directly enables interaction between the gratings of the horn and the electron beam. Kramer teaches no such interaction, and it is clear from Kramer's own teachings that the reference is not even fully applicable to the description of rotatable turret devices in paragraph 23.

First, Figs. 1 and 7 of the present Application both show laser beams reflected back from the gratings placed in the path of the laser beam. Kramer, on the other hand, clearly teaches that the laser beam is meant to pass *through* the diffraction gratings, and onto a different laser pathway. Not only would such a configuration fail to realize a substantial gain (discussed further below), it should expect to see a significant loss. Furthermore, the present Application, Walsh, and the newer Application to Coyle all confirm that an electron beam should be able to pass through an open channel or vertex of the horn structure, near the ruled gratings. Neither Kramer, nor the embodiment described in paragraph 23, indicate a configuration that could accomplish such close electron beam interaction with the gratings. Kramer shows no openings through which

any of the electron beams shown in the present Application, Walsh, or Coyle could pass. The effect of Kramer's spinning turret on the present electron beam should be negligible at best, thereby nullifying its ability to function as a grating horn.

It is most important to note that the Examiner, in citing to Kramer, repeatedly refers only to Fig. 5, which shows a cross-section only of the structure. If the view is limited to only Fig. 5 of Kramer, Kramer begins to appear more similar to some of views of the present embodiments taken from similar perspectives. All such similarities quickly disappear, however, when the overhead view of the same device shown in Fig. 7 of Kramer is considered. A cursory comparison of Kramer's Fig. 7 with Figs. 3A-B of the present Application destroys the assertion that the two devices are the same, or even in any way similar. In fact, even the cross-sectional views of the present Application, as shown in Figs. 6A-6G, all feature the clear placement of the circular electron beam 14 through the vertex of the horn structure. Nothing shown in Kramer's device would even allow for such passage of the electron beam 14 through the beveled portion of the grating elements 154. Kramer simply does <u>not</u> show the grating horn structure of claim 2, and the continued assertions to the contrary are clearly erroneous and improper.

3. The Answer's assertion that Kramer teaches grating elements oriented in phase is also clearly erroneous.

It should first be noted that, in the initial and final rejections of claim 2, as well as in the Advisory Action, the only cited passage from Kramer that was alleged to disclose grating elements oriented in phase was col. 11, lines 50-61 (Office Action of September 21, 2007, bottom of page 2; final Office Action of March 21, 2008, top of page 3, and page 4, second paragraph; Advisory Action of June 17, 2008, page 2, middle of first paragraph). Applicant meritoriously and repeatedly argued though, that the rejection was based on an incorrect assessment of inherency, since the Examiner admitted that Kramer taught that the gratings therein were only "*capable* of being arranged in phase." (See May 21, 2008 Response, page 9, second paragraph through page 10, second paragraph). This argument was not even addressed in the Advisory Action, which instead merely restated that "The phase orientation of these elements is adjustable and so it would have

been obvious to one having ordinary skill in the art at the time the invention was made to orient the adjustable phase orientations of the gratings in Kramer '956 to be in phase."

The Appeal Brief included a detailed – and unchallenged – rebuttal of this statement so repeated in the Advisory Action with respect to grating elements oriented in phase. (See Appeal Brief, pages 7 and 8, section A.3).

Thus, the Board should now see that the Examiner's Answer, for the first time, relies on a different section of Kramer and a new technical argument have been used to support the rejection. In this new assertion (page 13 of the Answer, second full paragraph), the Examiner asserts that "Kramer teaches the need for this adjustability to orient the gratings in phase (col. 11, lines 62-65). In teaching theorientation of the gratings in phase, Kramer '956 refers to the phase as 'facet periodicity (D values) (col. 11, lines 62-65)." Even though conceding the merits of Applicant's previous arguments, this new rationale is also entirely incorrect.

The Examiner has mistakenly confused *spatial adjustment of gratings to insure straightness of cross-scan lines*, with orientation of gratings in phase. The two phenomena are not equivalents, as incorrectly implied in the Answer.

The text from Kramer that is now relied on reads, in its entirety, "The grating tilt adjustment mechanism can be used to compensate for facet to facet (grating to grating) cross-scan error caused by small differences in facet periodicity (D values)." (Col. 11, lines 62-65). Not only does this text portion fail to even mention "phase," or "in phase," the cited portion fails to teach or suggest that facet periodicity and D values of the gratings have any automatic relationship with the grating elements being "in phase." As explained below, this assumption by the Examiner is clearly erroneous.

Kramer's "grating tilt adjustment mechanism" is not provided for to address phase orientation, but is instead expressly provided for the purpose of obtaining cross-scan lines that are straight and not bowed. As explained by Kramer:

It is a still further object of the present invention to provide an improved hologon scanner having a plurality of individual grating facets adjustably disposed within a rotatable holder and which allows adjustment thereof, as by tilting the facets, to

compensate for facet to facet cross-scan error caused by small differences in grating period, substrate wedge or fixed tilts of the shaft from the motor which is connected in driving relationship with the hologon scanner. (Col. 3, lines 27-35).

The significance of "D values" as cited from col. 11, lines 62-65 of Kramer, is explained by another passage of the reference that accompanies the description of FIG. 5:

It is evident from this example that a bowed scan line results from very small deviations of the scan beam from being perpendicular to the deflector rotation axis. The scan beam angle with respect to the rotation axis 16 is determined by the angle the grating facet 10 makes with the axis 16, the angle, θ_i, the wavelength, λ, of the incident light on the grating facet 10, and the grating period D. In terms of the grating facet normal, the relationship between θ_i, and θ_d, is given by the grating equation:

$$\sin \theta_i + \sin \theta_d = \lambda/\mathbf{D} \tag{3}$$

For the geometry illustrated in FIG. 1, $\theta_i = \theta_d = 45°$ and λ/D=1.4142. If the grating facet is at 45° to the rotation axis 16, the scanned beam is exactly perpendicular to the rotation axis and a bow-free scan line results. If the grating facet deviates by a small angle from being at 45° to the incident beam, equation (1) states that the scan beam will be essentially perpendicular to the rotation axis 16, and the scan line will be essentially bow-free. If on the other hand, the grating facet is at 45° to the rotation axis 16, and θ_i is slightly deviated from being at 45° to the grating normal, θ_d will be deviated by the same amount and may introduce measureable bow into the scan line. (Col. 7, lines 25-50).

According to these clear teachings from Kramer, therefore, the purpose of the "tilt adjustment" is only to *provide a straight scan line*, in case where "θ_i is slightly deviated from being at 45° to the grating normal." As can be seen in FIG. 1, however, θ_i is an angle formed by a substrate of a grating with respect to an input beam, and θ_d is an angle formed by the grating itself with respect to a "scan beam" formed thereby. Kramer merely describes that a mechanism to correct tilt of the grating acts to compensate for any deviation such as substrate wedge or a fixed tilt of an axis that the grating is aligned to, so that a scan line formed by the interaction thereof is straight. Tilting the grating changes

the interaction of the input beam with the grating, but such interaction is a matter of trigonometry, and not one of arranging the gratings to somehow be "in phase."

Moreover, the Examiner's new assertions regarding Kramer's facet periodicity are also expressly contradicted by express teachings of the unchallenged disclosure of the present Specification. As discussed above, paragraph 23 (and Fig. 1) of the present Specification describes an example similar to that proposed by the Examiner, that is, a rotatable laser turret having a plurality of gratings, used to extend the wavelength coverage for interaction with an electron beam. In this example from the present Specification, "each of the plurality of gratings [is] rotatable to beam focus position 20 and having a <u>different periodicity</u>." (Emphasis added). According to the portion of Kramer cited by the Examiner, however, even "small differences in facet periodicity" in Kramer are to be avoided and/or compensated for by the cited adjustment mechanism. In other words, Kramer expressly teaches the exact *opposite* periodicity configuration from what the present Specification discloses. The combination of technologies proposed by the Examiner could not realize the results of the example described by the present Specification.

Accordingly, since the present invention includes orientation in phase, the Examiner's interpretation of the *spatial* periodicity in Kramer is either exactly wrong with respect to phase, or else the phase orientation is not necessarily dependent on the spatial periodicity. The Examiner was required to have given full consideration to the unambiguous teachings of the present Specification before maintaining or reasserting the rejection in this regard. This portion of the Specification though, does not appear to have been given any consideration.

It must again be pointed out here that it is well known in the art – and expressly confirmed by Walsh (discussed above) – that non-FEL lasers, like that shown by Kramer "lack tunability." The rationale presented in the Answer thus further confuses the physical "*adjustability*" of Kramer's gratings with the "<u>tunability</u>" of an FEL. The rejection also appears to fail to consider how phase orientation would be affected, according to the Examiner's rationale, when moving from the more symmetrical cross-

sectional view of Kramer's turret (Fig. 5, for example), to the more asymmetrical overhead view of the same device (Fig. 7). Kramer simply does not address the issue of phase orientation, and the rejection is fatally flawed in this regard as well.

4. The Answer still fails to indicate any objective rationale for the proposed combination of Kramer with Walsh.

Applicant has not disputed that Walsh teaches a planar grating element that interacts with an electron beam and produces Terahertz radiation. Applicant has consistently and meritoriously disputed though, the Examiner base assertion that Kramer's rotatable turret can be simply substituted for the planar gratings taught by Walsh, and thus amount to a grating horn by this proposed combination. No actual teaching or suggestion has been cited from either reference in support of the alleged motivation to make the combination, the combination as proposed is expressly contradicted by the unchallenged disclosure of the present Specification, and even if the combination could be made, it still could not meet the requirements of independent claim 2.

The Board should take specific note that, even after several meritorious traversals, the Answer still fails to cite to a single teaching or suggestion from either Kramer or Walsh that indicates any motivation for one of ordinary skill in the art to make the combination. The only portions cited from Walsh for the alleged motivation (col. 3, lines 59-62; col. 4, lines 20-24) simply describe that grating elements can be used with an FEL device and generate radiation in the FIR range. The cited portions indicate <u>nothing</u> about why or how Walsh could be combined with an additional device such as that shown by Kramer. The cited "motivation" therefore, addresses only Walsh's own capabilities – which are fully described and incorporated by reference in the Background of the present Specification (see paragraph 4) – and not the proposed *substitution* of Kramer's device for Walsh's planar gratings, which is the modification actually proposed by the Examiner. Section 2143.01 of the MPEP expresses that the proposed substitution must itself be affirmatively taught or suggested by the references, or else it must be based on

some well-known principle in the art. Because this requirement has not been satisfied, the rejection is thus further deficient on its face.

Not only has there still been no objective motivation cited for the proposed combination, the present Specification expressly contradicts the very combination the Examiner asserts to be obvious. As discussed above, paragraph 23 and Fig. 1 of the present Specification show an embodiment where a rotatable turret can be implemented with an FEL, but this embodiment is exactly the opposite to the device taught by Kramer with respect to the periodicity of the gratings. The Examiner admits that Kramer does not teach Terahertz radiation, and paragraph 23 describes how a configuration opposite to Kramer is implemented to extend the wavelength coverage to such a range. In other words, Kramer clearly teaches away from the very configuration that would be required to extend the wavelength coverage to range asserted by the Examiner. The conclusion of obviousness is thus further deficient for at least these reasons as well.

And even had the Examiner been able to cite to some objective teaching or suggestion in support of the motivation to combine the references, the proposed combination still would not meet the limitations of a grating horn, as erroneously asserted. As described in paragraph 35 of the present Specification, a grating horn in an FEL device includes more than just the focusing effect of the horn. A grating horn additionally includes enhanced feedback from a partial closure (or wrapping) about the electron beam. Even if Kramer's rotatable turret were substituted for Walsh's planar grating, Kramer's structure could not provide a partial closure about a separate electron beam. Therefore, even the Examiner's proposed combination cannot satisfy the definition of a grating horn.

5. The advantages of the present claims still remain unchallenged.

The Board should note that the Answer (pages 15-16) fails to challenge, or even discuss, a single advantage that a grating horn realizes over the prior art. Instead, the Answer simply makes the broad pronouncement that the combination of references "teach the grating horn element of claim 2 *as well as any advantages presented by applicant* in response to the rejection." (Emphasis added). A cursory denial is not a

rebuttal or a substantive challenge. Accordingly, the advantages of a grating horn remain undisputed on the record.

The present Specification is replete with advantages achieved by a grating horn over prior art devices. The Examiner specifically acknowledges paragraph 35 of the Specification, but does not refute a single advantage described therein, including, but not limited to the increased evanescent region of the electron beam, greater energy transfer, and improved laser performance. A grating horn according to claim 2 produces "significantly higher collectable power" than even a planar grating horn (see Fig. 3A of the present Application), which itself is described as a significant improvement over the planar grating configurations taught by Walsh. (See paragraph 36). A grating horn according to claim 2 is described to achieve improved brightness and intensity (paragraphs 44-45), and even Coyle, discussed above, recognizes that grating horns "enhance the coupling dramatically." (US 2008/0060455, paragraph 69).

The portion of the Answer that purports to respond to these arguments also represents a fundamental misunderstanding of the technology involved in this field of art. At page 16, lines 6-11 of the Answer, the Examiner admits that Kramer fails to teach an electron beam, but then asserts that Walsh's electron beam can be substituted for Kramer's laser in Kramer's device. One of ordinary skill in this field of art would easily know, however, that the laser beam and the electron beam are not *interchangeable*. Figs. 1 and 7 of the present Application undisputedly demonstrate that the laser and electron beams are both <u>utilized together</u> in a tunable FEL device. The two different beams serve entirely different purposes, and one does not "replace" the other, as erroneously proposed by the Examiner. Kramer and Walsh cannot be combined/modified as the Examiner so proposes.

6. The Examiner's assertions regarding the subject matter of claims 3 and 4 are even further erroneous.

Although claims 3 and 4 are allowable at least due to their dependence from claim 2, the Board should take note of several additional factual errors again asserted against these claims in the Answer.

With respect to claim 3, for example, the Examiner erroneously asserts that Kramer "teaches the grating elements *forming a V-groove* and vertex to the flat base" in Fig. 5 of the reference. (Page 4 of Answer, lines 1-2, emphasis added). Fig. 5 of Kramer, however, is a cross-sectional view that only shows a vertex of a V-*shape* formed between the gratings. Nowhere is a V-<u>groove</u> taught or suggested in Fig. 5, or elsewhere in the reference. In fact, Fig. 7 of the reference clearly shows that no such groove exists at the vertex. Only a small pentagonal shape appears (element 62/108, conical washer) where the gratings join at the vertex, but no reasonable interpretation of the conical washer could conclude that it amounts to a "groove," or more particularly, a <u>V-groove</u>. The plain dictionary definition of a "groove" is a "long, narrow cut or indentation in a surface." Kramer shows nothing that could satisfy this plain meaning. It is inappropriate for the Examiner to extrapolate such a structural feature from the sectional view of Kramer's Fig. 5, when such an extrapolation is directly contradicted by the overhead view of Kramer's Fig. 7. The rejection of claim 3 is thus still deficient on its face.

With respect to claim 4, the Answer asserts equally significant factual errors. The Answer states that Walsh "teaches *each of the grating elements* being ruled perpendicular to a face of the grating element" at col. 10, lines 56-59. (Page 4 of Answer, lines 3-4, emphasis added). The cited portion from Walsh, however, expressly states that only a "single-element" is ruled, which, by definition, could not read upon the required <u>pair of grating elements</u> from claim 4. The Examiner has submitted no evidence that a single grating element is equivalent to a pair of elements, and particularly in the context of a grating horn. Walsh has clearly been misinterpreted, and the rejection of claim 4 is thus still deficient on its face.

B. The Section 103 Rejection Of Claim 6 Is Still Deficient on Its Face.

The portion of the Answer that attempts to respond to the arguments in favor of claim 6 also makes significant factual misstatements regarding the prior art, and otherwise fails to rebut the meritorious arguments presented by Applicant.

First, Applicant is baffled by the continued reliance in the Answer on the statement that "Hamada '075 teaches the use of two grating elements *flared from a*

central vertex non-intersecting the flat base, where rulings of the grating elements extend between the vertex and the flat base (col. 6, lines 35-39)." The cited text portion fails to support this statement in any way, and the accompanying Fig. 7 of Hamada directly <u>contradicts</u> the entire assertion. The cited text merely describes that, in addition to the single planar grating G, a grating can be formed at F1 and/or F2, as shown in Fig. 7. Nothing in this text portion, however, suggests that two such gratings are flared from a central vertex of a flat base. In fact, a flat base is never discussed by Hamada. Fig. 7 though, clearly shows that gratings at G, F1, and F2 are completely parallel to one another, and thus could not flare from the same central vertex, by definition. Hamada has been clearly misinterpreted in this regard, thereby rendering the rejection fatally flawed.

Second, the Board should take note that the Answer fails to respond to Applicant's meritorious arguments that Hamada's "sharp moire pattern" is irrelevant to the present grating horn, or an FEL device in general. Hamada, like Kramer, deals only with a simple laser beam, and does not consider an electron beam interacting with the laser. As discussed above, the Examiner's proposal to substitute the electron beam for the laser beam represents a fundamental misunderstanding of this field of art. The laser beam and the electron beams may <u>interact</u>, of course, but they are not *interchangeable*. Any "sharp moire pattern" benefits seen by a laser beam would be irrelevant to an electron beam.

Moreover, the new attempt in the Answer to justify the rationale for combining Hamada with Kramer and Walsh significantly misrepresents the cited teachings from Hamada. For example, the Answer (page 19, lines 12-14) states that "In clarifying the advantages of a sharp moire pattern, Hamada '075 teaches the ability to have an output in areas in which a grating ruling was not previous formed (col. 6, lines 30-34 and lines 40-43)." Respectfully, the cited portions of Hamada teach nothing of the sort. The cited text merely describes that no image is formed at certain points (P1, P2) between gratings, and that a contrasty image is not produced if a second grating is not used. Hamada never suggests an *additional* ability to have an output in areas where the grating was not formed.

The Examiner further appears to confuse the basic principles of image-forming in optic configurations. The new rationale presented to justify the combination with Hamada asserts that the combination would result in an image output being formed *inside of Kramer's rotatable turret* "in between parts 50 and 52." Kramer does not suggest though that any image should be formed *inside* of the rotating turret. In fact, Kramer clearly shows that an image is only formed on the surface of image plane 24, which is well away from the entirety of the rotatable turret device. The new rationale makes no sense. No evidence has been submitted on the record to suggest that one of ordinary skill in the art would be motivated to form a separate image inside of the turret. This attempt to answer Applicant's arguments against the conclusion of obviousness renders the rejection even further deficient.

CONCLUSION

Accordingly, Applicant/Appellant respectfully submits that at least claims 2-9 are all patentably distinct over the cited prior art of record. The Board is respectfully requested to reverse the rejection of all of these claims, and find that all of claims 2-9 warrant patent protection.

No fees are believed due in connection with this Reply Brief. Nevertheless, the Commissioner is hereby authorized to charge any fees which may be deemed necessary to make this submission both timely and complete to Deposit Account Number 12-0600.

Respectfully submitted,

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